CLAIMS

1. (currently amended) A signal synthesizer ~~(e.g., 208)~~ comprising a loop filter ~~(e.g., 214)~~ connected between a charge pump ~~(e.g., 212)~~ and an oscillator ~~(e.g., 216)~~ of the signal synthesizer to accumulate charge from the charge pump and generate at least a first control signal ~~(e.g., V_{CTRL})~~ for the oscillator, the loop filter comprising:

a damping capacitor ~~(e.g., C1)~~ connected at a first node to a resistor ~~(e.g., R1)~~ connected to the oscillator to generate the first control signal for the oscillator;

a matching capacitor ~~(e.g., C1')~~; ~~and~~

sensing-and-canceling circuitry ~~(e.g., 502, 504, 506)~~ connected to the damping capacitor and to the matching capacitor and adapted to (1) drive a voltage across the matching capacitor to match a first reference voltage ~~(e.g., V_{REF})~~ applied to an input of the sensing-and-canceling circuitry and (2) generate, based on a first current associated with driving the voltage across the matching capacitor, a second current applied to the damping capacitor to compensate for leakage current in the damping capacitor; and

a transconductor capacitor connected to the oscillator to generate a second control signal for the oscillator.

2. (currently amended) The invention of claim 1, wherein:

the signal synthesizer is a PLL;

a first side of the resistor is connected to the damping capacitor at the first node;

a second side of the resistor is connected to both the charge pump and the oscillator; and

the first control signal is generated based on a second voltage at the second side of the resistor.

3. (original) The invention of claim 1, wherein the oscillator is adapted to use the first control signal for steady-state control of the synthesizer.

4. (currently amended) The invention of claim 1, wherein the sensing-and-canceling circuitry comprises:

an operational amplifier (op amp) ~~(e.g., 502)~~ adapted to generate a voltage difference signal based on a difference between the voltage across the matching capacitor and the first reference voltage;

a first transistor ~~(e.g., 504)~~ connected (1) to receive the voltage difference signal from the op amp at a gate of the first transistor and (2) to apply a first transistor output signal to the matching capacitor; and

a second transistor ~~(e.g., 506)~~ connected (1) to receive the voltage difference signal from the op amp at a gate of the second transistor and (2) to apply a second transistor output signal to the damping capacitor.

5. (original) The invention of claim 1, wherein gate oxide thickness of the damping capacitor is substantially less than about 50 Angstroms.

6. (original) The invention of claim 5, wherein the gate oxide thickness of the damping capacitor is about 17 Angstroms or less.

7. (original) The invention of claim 1, wherein the sensing-and-canceling circuitry is adapted to generate the second current as a scaled version of the first current based on a capacitance ratio between the damping capacitor and the matching capacitor.

8. (canceled)

9. (currently amended) The invention of claim [[8]] 1, wherein gate oxide thickness of the transconductor capacitor is substantially less than about 50 Angstroms.

10. (original) The invention of claim 9, wherein the gate oxide thickness of the transconductor capacitor is about 17 Angstroms or less.

11. (currently amended) The invention of claim [[8]] 1, wherein the oscillator is adapted to use the second control signal to set a center frequency for the oscillator.

12. (currently amended) The invention of claim [[8]] 1, wherein the loop filter further comprises an analog transconductor (gm) cell connected between (1) the first node and (2) the transconductor capacitor, wherein the gm cell is adapted to generate a first gm output signal based on a difference between [[a]] the voltage at the first node and a second reference voltage ~~(e.g., V_{REF})~~ applied to an input of the gm cell, wherein the first gm output signal is applied to the transconductor capacitor.

13. (original) The invention of claim 12, wherein the second reference voltage is equal to the first reference voltage.

14. (currently amended) The invention of claim 12, wherein the loop filter further comprises a digital gm path ~~(e.g., 702, 704, 706)~~ adapted to (1) digitally accumulate differences between the voltage at the first node and the second reference voltage and (2) generate a second gm output signal based on the accumulated differences, wherein the second gm output signal is also applied to the transconductor capacitor.

15. (currently amended) The invention of claim 14, wherein the digital gm path comprises:

a comparator ~~(e.g., 702)~~ adapted to generate digital differences between the voltage at the first node and the second reference voltage;

an accumulator ~~(e.g., 704)~~ adapted to accumulate the digital differences; and

a converter ~~(e.g., 706)~~ adapted to convert the accumulated digital differences from the accumulator into the second gm output signal.

16. (currently amended) The invention of claim [[8]] 1, wherein the loop filter further comprises a digital gm path ~~(e.g., 602, 604, 606)~~ adapted to (1) digitally accumulate differences between the voltage at the first node and the second reference voltage and (2) generate a gm output signal based on the accumulated differences, wherein the gm output signal is applied to the transconductor capacitor.

17. (currently amended) The invention of claim 16, wherein the digital gm path comprises:

a comparator ~~(e.g., 602)~~ adapted to generate digital differences between the voltage at the first node and the second reference voltage;

an accumulator ~~(e.g., 604)~~ adapted to accumulate the digital differences; and

a converter ~~(e.g., 606)~~ adapted to convert the accumulated digital differences from the accumulator into the gm output signal.

18. (original) The invention of claim 16, wherein the converter is a voltage source adapted to generate the gm output signal as a voltage signal.

19. (original) The invention of claim 16, wherein the converter is a current source adapted to generate the gm output signal as a current signal.

20. (currently amended) A signal synthesizer ~~(e.g., 208)~~ comprising a loop filter ~~(e.g., 214)~~ connected between a charge pump ~~(e.g., 212)~~ and an oscillator ~~(e.g., 216)~~ of the signal synthesizer to accumulate charge from the charge pump and generate at least a first control signal ~~(e.g., V_{BG})~~ for the oscillator, the loop filter comprising:

a resistor ~~(e.g., R1)~~;

a damping capacitor ~~(e.g., C1)~~ connected at a first node to the resistor;

a transconductor capacitor ~~(e.g., C3)~~ connected to generate the first control signal for the oscillator; and

a digital gm path ~~(e.g., 602-606 or 702-706)~~ adapted to (1) digitally accumulate differences between a reference voltage ~~(e.g., V_{REF})~~ and a voltage at the first node and (2) generate a first gm output signal based on the accumulated differences, wherein the first gm output signal is applied to the transconductor capacitor.

21. (original) The invention of claim 20, wherein the signal synthesizer is a PLL.

22. (original) The invention of claim 20, wherein gate oxide thickness of the transconductor capacitor is substantially less than about 50 Angstroms.

23. (original) The invention of claim 22, wherein the gate oxide thickness of the transconductor capacitor is about 17 Angstroms or less.

24. (original) The invention of claim 20, wherein the oscillator is adapted to use the first control signal to set a center frequency for the oscillator.

25. (currently amended) The invention of claim 20, wherein the loop filter further comprises an analog transconductor (gm) cell ~~(e.g., Gm of Fig. 7)~~ connected between (1) the first node and (2) the transconductor capacitor, wherein the gm cell is adapted to generate a second gm output signal based on a difference between the voltage at the first node and the reference voltage, wherein the second gm output signal is also applied to the transconductor capacitor.

26. (currently amended) The invention of claim 20, wherein the digital gm path comprises:

a comparator ~~(e.g., 602 or 702)~~ adapted to generate digital differences between the voltage at the first node and the reference voltage;

an accumulator ~~(e.g., 604 or 704)~~ adapted to accumulate the digital differences; and

a converter ~~(e.g., 606 or 706)~~ adapted to convert the accumulated digital differences from the accumulator into the second gm output signal.

27. (original) The invention of claim 26, wherein the converter is a voltage source adapted to generate the second gm output signal as a voltage signal.

28. (original) The invention of claim 26, wherein the converter is a current source adapted to generate the second gm output signal as a current signal.

29. (currently amended) A signal synthesizer ~~(e.g., 208)~~ comprising a loop filter ~~(e.g., 214)~~ connected between a charge pump ~~(e.g., 212)~~ and an oscillator ~~(e.g., 216)~~ of the signal synthesizer to accumulate charge from the charge pump and generate at least a first control signal ~~(e.g., V_{CTRL} or V_{BG})~~ for the oscillator, the loop filter comprising:

a transconductor capacitor ~~(e.g., C1 or C3)~~ connected to the oscillator to contribute to the generation of the first control signal for the oscillator; and

~~sensing-and-canceling circuitry (e.g., C1' and 502-506 of Fig. 5 or 602-606 of Fig. 6 or 702-706 of Fig. 7) adapted to generate a current~~ a digital gm path adapted to (1) digitally accumulate differences between (i) a voltage at a first node in the loop filter and (ii) a first reference voltage and (2) generate a first gm output signal based on the accumulated differences, wherein the first gm output signal is applied to the transconductor capacitor to compensate for leakage current in the transconductor capacitor.

30. (currently amended) The invention of claim 29, wherein the loop filter further comprises:

~~the capacitor is~~ a damping capacitor ~~(e.g., C1)~~ connected to a resistor ~~(e.g., R1)~~ to generate ~~the first~~ a second control signal ~~(e.g., V_{CTRL})~~ for the oscillator; and

[[the]] sensing-and-canceling circuitry ~~comprises~~ comprising a matching capacitor ~~(e.g., C1')~~, wherein the sensing-and-canceling circuitry is adapted to (1) drive a voltage across the matching capacitor to match a first reference voltage ~~(e.g., V_{REF})~~ and (2) generate, based on a first current associated with driving the voltage across the matching capacitor, a second current applied to the damping capacitor to compensate for leakage current in the damping capacitor.

31. (canceled)

32. (currently amended) The invention of claim [[31]] 29, wherein the loop filter further comprises an analog transconductor (gm) cell ~~(e.g., Gm of Fig. 7)~~ connected between (1) the first node and (2) the transconductor capacitor, wherein the gm cell is adapted to generate a second gm output signal based on a difference between the voltage at the first node and the first reference voltage, wherein the second gm output signal is also applied to the transconductor capacitor.

33. (original) The invention of claim 29, wherein gate oxide thickness of the capacitor is substantially less than about 50 Angstroms.

34. (original) The invention of claim 33, wherein the gate oxide thickness of the capacitor is about 17 Angstroms or less.

35. (new) A signal synthesizer comprising a loop filter connected between a charge pump and an oscillator of the signal synthesizer to accumulate charge from the charge pump and generate at least a first control signal for the oscillator, the loop filter comprising:

a damping capacitor connected at a first node to a resistor connected to the oscillator to generate the first control signal for the oscillator;

a matching capacitor; and

sensing-and-canceling circuitry connected to the damping capacitor and to the matching capacitor and adapted to (1) drive a voltage across the matching capacitor to match a first reference voltage applied to an input of the sensing-and-canceling circuitry and (2) generate, based on a first current associated with driving the voltage across the matching capacitor, a second current applied to the damping capacitor to compensate for leakage current in the damping capacitor, wherein the first reference voltage is different from the first control signal.

36. (new) A signal synthesizer comprising a loop filter connected between a charge pump and an oscillator of the signal synthesizer to accumulate charge from the charge pump and generate at least a first control signal for the oscillator, the loop filter comprising:

a damping capacitor connected at a first node to a resistor connected to the oscillator to generate the first control signal for the oscillator;

a matching capacitor; and

sensing-and-canceling circuitry connected to the damping capacitor and to the matching capacitor and adapted to (1) drive a voltage across the matching capacitor to match a first reference voltage applied to an input of the sensing-and-canceling circuitry and (2) generate, based on a first current associated with driving the voltage across the matching capacitor, a second current applied to the damping capacitor to compensate for leakage current in the damping capacitor, wherein:

the resistor is connected between the damping capacitor and the oscillator; and

the second current is applied at the first node.